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NTE1863
Integrated Circuit
Single–Chip Signal Processor for Color TV

Description:

The NTE1863 is a single–chip integrated circuit in a 42–Lead DIP type package and incorporates a circuit to process all types of signals (VIF, SIF, video, chroma, deflection) for color TVs based on the NTSC system. In designing this device, its basic characteristics including synchronization performance are greatly improved, and taking into consideration its needed application in AV equipment such as VCRs, the necessity of adjustment is substantially reduced. A simple, compact color TV can be implemented by simply connecting a tuner, power supply, and output circuit to the NTE1863.

When using the NTE1863 in conjunction with vertical output–use IC NTE1855, only one connection (vertical timing pulse) is required, with no connection required for feedback, thus simplifying layout of printed circuit pattern.

Features:

- Small–sized Package
- Minimum Number of External Parts Required

VIF–SIF

- Excellent Buzz Beat Characteristics
- High–Gain VIF Amplifier Eliminating the need for a Preamplifier
- AGC Speed can be Increased
- Video/Audio Simultaneous Muting, or Audio–Only Muting Possible

Video–Chroma

- A Quadratic Differentiation Circuit allowing Soft Video Tone Operation is also Incorporated
- Adjustment–free Chroma Sync

Deflection

- Adjustment–free Horizontal, Vertical Sync
- Dual AFC System with Excellent Horizontal Noise Characteristics
- Vertical Sync Stabilizing Circuit which is Scarcely Affected by Motor Noise

Absolute Maximum Ratings: (T_A = +25°C unless otherwise specified)

Supply Voltage, V_9max, V_{11}max 12V
Supply Current, I_{20}max 16mA
Allowable Power Dissipation ($T_A \le +65°C$), $P_d$max 1.3W
Operating Temperature Range, T_{opr} . . . . . –10° to +65°C
Storage Temperature Range, T_{stg} . . . . . –55° to +125°C
Circuit Current,
    I_{36}max . . . . . –6mA
    I_4max . . . . . –3mA
FBP Input Current (Peak Current),
    I_{21}max 5mA
    I_{19}max 10mA

Recommended Operating Conditions: (T_A = +25°C unless otherwise specified)

Supply Voltage, V_9, V_{11} 9V
Supply Current, I_{20} 13mA
Operating Voltage Range, V_9op, V_{11}op ..... 8V to 10V
Operating Current Range, I_{20}op ..... 10mA to 16mA

Operating Characteristics: (T_A = +25°C, V_{CC} = V_9 = V_{11} = 9V, I_{CC} = I_{20} = 13mA unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Circuit Voltage, Current						
Horizontal Supply Voltage	V_{20}	V_{CC} = 9V, I_{CC} = 13mA	7.3	7.8	8.3	V
Supply Current	$I_9 + I_{11}$	V_{CC} = 9V, I_{CC} = 13mA	67	93	124	mA
VIF (fp = 58.75MHz)						
Video Detector DC Output Voltage	V_{36}	Quiescent	4.2	4.6	5.0	V
AFT Output Voltage	V_{38}	Quiescent	2.8	4.2	5.7	V
Maximum RF AGC Control Voltage	V_{40H}	CW = 85dBμ, RF AGC VR = min	7.6	8.0	8.3	V
Minimum RF AGC Control Voltage	V_{40L}	CW = 85dBμ, RF AGC VR = min	0	0.01	0.3	V
VIF Input Sensitivity	V_i	VIF input level at which video output is 0.8V_{P-P} (40% MOD)	30	36	42	dBμ
VIF AGC Control Range	GR	Maximum input (V0 = 0.8V_{P-P}) input sensitivity	62	70	–	dB
VIF Maximum Permissible Input	$V_i$max	VIF input level at which video output is +1dB	102	110	–	dBμ
Video Detector Output	V_{O36}	V_i = 80dBμ, AM = 78% MOD	1.7	2.0	2.3	V_{P-P}
Differential Gain	DG	V_i = 80dBμ, 87.5% VIDEO MOD	–	3.0	10	%
Differential Phase	DP	V_i = 80dBμ, 87.5% VIDEO MOD	–	3.0	10	deg
Video S/N	S/N	V_i = 80dBμ, AM = 78% MOD / CW	47	53	–	dB
Sync–Tip Level	V_{36}TIP	CW = 80dBμ	2.0	2.3	2.6	V
Video Frequency Characteristic	f_C	Frequency at which video output is down 3dB	5.0	7.0	–	MHz
VIF Intermodulation	I_{920}	V3.58MHz/V920kHz, V_i = 80dBμ	28	35	–	dB
Maximum AFT Control Voltage	V_{38H}	CW = 80dBμ, frequency change	8.2	8.6	8.9	V
Minimum AFT Control Voltage	V_{38L}	CW = 80dBμ, frequency change	0.1	0.3	0.8	V
AFT Detector Sensitivity	Sf	CW = 80dBμ, frequency change	50	80	120	mV/kHz
AFT Switch Operation Start Voltage	V_{AFT}SW	Test with sweep signal	1.0	5.0	–	V
Black Noise Threshold Level	V_{BTH}	Test with sweep signal	1.2	1.5	1.8	V
White Noise Threshold Level	V_{WTH}	Test with sweep signal	4.9	5.3	5.7	V
SIF AF (fs = 4.5MHz)						
Sound D Input Limiting Sensitivity	$V_i$lim	SIF input level at which detection output is down 3dB	–	48	55	dBμ
FM Detector Output Voltage	V_{O1}	V_i = 100dBμ, Δf = ±25kHz	380	550	750	mVrms
FM Detector Output Distortion	THD	V_i = 100dBμ, Δf = ±25kHz	–	0.4	1.0	%
AM Rejection	AMR	V_i = 100dBμ FM: Δf = ±25k / AM: 30%	40	53	–	dB
AF Amp Voltage Gain	G_{AF}	V_i = 100mVrms, f = 400Hz	18	20	22	dB

Operating Characteristics (Cont'd): (T_A = +25°C, V_{CC} = V_9 = V_{11} = 9V, I_{CC} = I_{20} = 13mA unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
SIF AF (Cont'd) (fs = 4.5MHz)						
AF Maximum Output Voltage	V_{04}max	Output level at which AF amp output distortion is 10%	2.0	3.0	–	Vrms
AF Electronic Attenuator Range	A_{TT}	V_i = 200mVrms, f = 400Hz	70	80	–	dB
Video						
Soft Video Tone Variable Range	ΔSoft	f = 2MHz, 100mV_{P-P}, video tone VR: 4V → 0V	–6	–4	–2	dB
Sharp Video Tone Variable Range	ΔSharp	f = 2MHz, 100mV_{P-P}, video tone VR: 4V → 9V	8	11	14	dB
Video Voltage Gain	GV	f = 100kHz, 100mV_{P-P}, contrast VR: 9V, video tone VR: 4V	17	20	23	dB
Contrast Control Center	C_{CEN}	f = 100kHz, 100mV_{P-P}, contrast VR: 6V	0.45	0.57	0.69	V_{P-P}
Contrast Variable Range	ΔCV	Contrast VR: 3V → 9V	19	21	23	dB
Bright Control	B_{RH}	Bright VR: 2V	5.8	–	–	V
	B_{RCEN}	Bright VR: 4.5V	2.6	3.1	3.6	V
	B_{RL}	Bright VR: 7V	–	–	1.2	V
Frequency Response	f_V	Contrast VR: 6V, video tone VR: 4V, 3dB down	88	93	–	%
Chroma						
ACC Amplitude Characteristics	ACC1	+6dB	–3	0	+3	dB
	ACC2	–20dB	–7	–	+2	dB
ACC Phase Characteristics	ACCP1	+6dB	–3	0	+3	deg
	ACCP2	–20dB	–7	–	+7	deg
Killer Operating Point	EK		–51	–44	–37	dB
Color Control Minimum	ECmin	Color VR: 0V, Contrast VR: 9V	–	–	30	mV_{P-P}
Color Residue Color Control Center	EC CEN	Color VR: 4.5V, Contrast VR: 6V	1.6	2.4	3.2	V_{P-P}
Minimum Demodulator Output	ECmax	Color VR: 9V, Contrast VR: 9V	4.0	5.0	–	V_{P-P}
Contrast Color Variable Range	ΔCC	Color VR: B–Y = 2.5mV_{P-P}, Contrast VR: 3V → 9V	17.5	19.0	20.5	dB
Tint Control Center	T_{CEN}	Tint VR: 4.5V, Color VR: 4.5V, Contrast VR: 6V	–16	–4	+8	deg
Tint Variable Range	ΔT	Tint VR: 0V ← 4.5V → 9V, Color VR: 4.5V, Contrast VR: 6V	±40	–	–	deg
APC Pull–In Range	Δf_{APC}		±350	–	–	Hz
Demodulator Output Ratio	R/B	Monochrome signal, Contrast VR: 6V, Color VR: B–Y = 1V_{po}	0.81	0.90	0.98	times
	G/B	Monochrome signal, Contrast VR: 6V, Color VR: B–Y = 1V_{po}	0.24	0.30	0.38	times

Pin Connection Diagram